Math 0304 Practice Test 4

75% → Factor

25% → Solve Quadratic Equations by factoring

Chapter 6.1 **GCF** — Is there any # in common or variable?

- 4 terms / Four terms → Factor Twice
- 3 term → ax^2+bx+c
- 2 terms → Diff of Squares a^2-b^2

a^3-b^3 Diff. of cubes

a^3+b^3 Sum of cubes

(1) $6x^2y - 9x^4y^3 =$ smallest, smallest

$\frac{6x^2y}{3x^2y} - \frac{9x^4y^3}{3x^2y}$

$3x^2y(2-3x^2y^2)$

(2) $25x^3y^5 + 15x^3y^2 =$

$\frac{25x^3y^5}{5x^3y^2} + \frac{15x^3y^2}{5x^3y^2}$

$5x^3y^2(5y^3+3)$

(3) $ab - ad + 3b - 3c$

$a(b-c) + 3(b-c)$

$(b-c)(a+3)$

(4) $2ab^2 - 6ac + b^2 - 3c$

$2a(b^2 - 3c) + 1(b^2 - 3c)$ Factor Twice

$(b^2 - 3c)(2a + 1)$

common left

(5) $1a^2 + 7a - 18$ GCF? no ✓

$(a + 7)(a - 2)$ $-18 = 9 \cdot -2$, $7 = 9 + (-2)$

one

multiply to last and add up to middle.

$(a+7)(a-2)$ or $(a-2)(a+7)$

(6) $1t^2 + 5t + 5$

$i = 5$ Impossible
$t = 5$

Prime

(7) $2p^2 - 3p - 2$ GCF? no

$(2p + 1)(1p - 2)$

2 cannot place values with common factors

$(2p+1)(1p-2)$

always check!

$1p$
$-4p$
$-3p$ ✓

$\longrightarrow \boxed{(2p+1)(p-2)}$

(8) $3h^2+19h-14$ $\quad -14 < -\frac{7}{2} < -2 < -\frac{1}{14} < -1$

GCF? no!

$3 \quad 1$

$(3h-2)(1h+7)$

$-2h$
$+21h$
$19h$ ✓

$\boxed{(3h-2)(h+7)}$

(9) $64y^2-16y+1$ GCF? no

$(8y-1)(8y-1) \longrightarrow \boxed{(8y-1)^2}$

$-8y$
$-8y$
$-16y$

(10) $1x^2+5xy-24y^2$ GCF? no

$(x+8y)(x-3y)$

$-24 = 8 \cdot -3$
$5 = 8 + (-3)$

$8xy$
$-3xy$
$+5xy$ ✓

$\boxed{(x+8y)(x-3y)}$

(11) $4x^2 - 4x - 80$ GCF? yes!

$4(1x^2 - 1x - 20)$ $4 = GCF$

$-20 = -5 \cdot 4$

$-1 = -5 + 4$

$4(x-5)(x+4)$ Answer

Remember to include 4!

(12) $p^2q^2 - 14pq^2 + 33q^2$

GCF? Yes!

$q^2(1p^2 - 14p + 33)$

$33 = -11 \cdot -3$

$-14 = -11 + -3$

$q^2(p-11)(p-3)$

$-11p$

$-3p$

$-14p$ ✓

Answer $q^2(p-11)(p-3)$

(13) $x^4 - 625$ GCF? NO!

$(x^2)^{2} - (25)^{2}$ ✓ 2 terms

$(+)(-)$ Rewrite

$(x^2 + 25)(x^2 - 25)$

$x^2 + 25$: not a diff. → (x^2+25)

$x^2 - 25$: continue? $x^2 - 5^2$ diff. of squares → $(x+5)(x-5)$

$(x^2+25)(x+5)(x-5)$

See that you need to continue!

(14) $x^2 - 4$

GCF? NO

2 terms — Diff. of sqs. / Diff of cubes.

$x^2 - 2^2$ Rewrite.

$(x+2)(x-2)$

(15) $49 + x^2$

GCF? NO

2 terms

$+$: Sum → Prime

x^2: Square

Sum of cubes?

(16) $x^3 + 1$

GCF? NO

2 terms → Sum of Cubes

Rewrite

$x^3 + 1^3$

Factor

$(x+1)(x^2 - 1x + 1)$

bases only: $(x)^2$, opp. prod. $x \cdot 1$, $(1)^2$

Answer: $(x+1)(x^2 - x + 1)$

(17) $x^3 - 125$

$5 \cdot 5 \cdot 5$

GCF? NO

2 terms ✓

Diff. of sqs.

Diff. of cubes

$x^3 - 5^3$

Rewrite

$(x-5)(x^2+5x+25)$ Factor

Bases only

x^2 — (base 1)^2 $(x)^2$

$5x$ — opp. prod. (base 1)(base 2)

25 — Positive (base 2)^2 $(-5)^2 = 25$

$(x-5)(x^2+5x+25)$

(18) $27y^3 - 125$

$3 \cdot 3 \cdot 3$ $\quad$ $5 \cdot 5 \cdot 5$

① GCF? NO

② 2 terms — Diff sqs — Diff. cubes

③ Rewrite

④ Factor

$(3y)^3 - 5^3$

$(3y-5)(9y^2+15y+25)$

$9y^2 = (3y)^2$

$15y$ — opp.

$25 = (-5)^2$

19-22 solve each equation

(19) $(x-3)(x+2)=0$ ✓ Zero factor property

✓ Step 1: Factor (trinomial)

Step 2: zero factor prop.

$x-3=0$ or $x+2=0$

$+3\ +3$ $\quad -2\ -2$

$\boxed{x=3}$ or $\boxed{x=-2}$ $\quad \{3,-2\}$

(20) $(4x-1)(3x+2)=0$ ✓

$4x-1=0$ or $3x+2=0$

$+1\ +1$ $\quad -2\ -2$

$\frac{4x}{4}=\frac{1}{4}$ or $\frac{3x}{3}=\frac{-2}{3}$

$\boxed{x=\frac{1}{4}}$ or $\boxed{x=-\frac{2}{3}}$ $\quad \boxed{\left\{\frac{1}{4},-\frac{2}{3}\right\}}$

(21) $1x^2+10x+21=0$ ✓

$(x+7)(x+3)=0$ $\quad 21=7\cdot 3$ ✓, $10=7+3$ ✓

$x+7=0$ or $x+3=0$ $\quad \{-7,-3\}$

$\boxed{x=-7}$ or $\boxed{x=-3}$

(22) $(w-8)(w+2)=24$ ✓ not zero.

$w^2+2w-8w-16=24$

$-24\ -24$

$w^2-6w-40=0$

(22) $w^2 - 6w - 40 = 0$

$(w-10)(w+4) = 0$ → $-40 = -10 \cdot 4$, $-6 = -10 + 4$

$w - 10 = 0$ | $w + 4 = 0$

$+10 \quad +10$ | $-4 \quad -4$

$w = 10$ | $w = -4$

$\{10, -4\}$

Applications

(23)

length $= x + 10 = 10 + 10 =$ 20 yd

width $= x =$ 10 yd

Area of a rectangle = length · width

$200\ yd^2 = (x+10) \cdot (x)$

$200 = x^2 + 10x - 200$

$-200 \quad -200$

$0 = 1x^2 + 10x - 200$

$-200 = 20 \cdot -10$

$10 = 20 + (-10)$

$0 = (x+20)(x-10)$

$x + 20 = 0$ | $x - 10 = 0$

$x = -20$ | $x = 10$

Let x = number

(24) If five times a number ($5 \cdot x$) is added to the square of the number (x^2), the result is 24. Find all such numbers.

$$5x + x^2 = 24$$

$$-24 \quad -24$$

$$x^2 + 5x - 24 = 0$$

$-24 = 8 \cdot -3$

$5 = 8 + (-3)$

$$(x+8)(x-3) = 0$$

$x + 8 = 0$

$-8 \quad -8$

$x = -8$

$x - 3 = 0$

$+3 \quad +3$

$x = 3$

$\{-8, 3\}$